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SCIENTIFIC INFORMATION REPORTChinese Science (15)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in six series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly, and the sixth series, Organization and Administration of Soviet Science, is issued every 6 weeks. Individual items are unclassified unless otherwise indicated.

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AGRICULTURAL SCIENCES

BREEDING WHEAT VARIETIES FOR RUST-RESISTANCE -- Peiping, Chung-kuo
Chih-su Pao-hu K'o-hsueh (Plant Protection Science in China), Science
Publishers, 1961, pp 292-306

[Pertinent information concerning 40 "important" rust-resistant varieties of wheat which are bred in China is presented in a paper entitled, "Research on the Utilization of the Rust-Resistant Properties of China's Wheat Varieties and Existing Problems," by Ch'en Shan-ming (7115/0910/6900), Institute of Plant Protection, China Academy of Agricultural Sciences. Listed alphabetically below are the Chinese designation of each of these varieties with Chinese Telegraphic Code (CTC) numbers (in parentheses) for the ideographic portion of the designation, followed by method of breeding, parents and/or their origin, the nature of resistance of the improved variety, and its classification as to spring or winter wheat in that order. These data, in some cases, are followed by an FDD interpretation (in brackets) of the name of the variety based on information from the present and other articles. The word "introduction," indicating a method of breeding, presumably means inbreeding of a variety introduced from abroad.

A summary of other information presented in the paper on China's breeding research relative to rust-resistant varieties of wheat is given after the list.]

Attention is called to the regional and provincial agricultural research institutes (Nung-yeh K'o-hsueh Yen-chiu-so, sometimes called Research Institute of Agricultural Science of Agricultural Science Research Institute by other translators) mentioned in this paper, which institutes the author indicates by the word "former" are no longer in existence. It is believed that they have been succeeded by regional and provincial branches of other components of the China Academy of Agricultural Sciences although little documentary evidence can be presented at this time to support this view. The 5 April 1962 issued of the Feiping Kuang-ming Jih-pao refers to the Kirin Provincial Academy of Agricultural Sciences as "the former Northeast Agricultural Research Institute.]

Forty Rust-Resistant Wheat Varieties Bred in China

Ai-li-to (4235/4721/1122); introduction; the Italian hybrid, Ardito; stripe- and leaf-rust-resistant winter. ["Dwarf makes plenty;" also Chinese approximation of parental variety]

Ch'ien-chiao (6929/0074); introduction; a US hybrid; stripe-, leaf-, and stem-rust-resistant; winter. [Coin Cross]

Chung-nung No 28 (0022,6593); introduction; 25HL12 from Italy; stripe-rust-resistance; winter. [Named after China Academy of Agricultural Sciences]

Chung-su 68 (0022/5685); hybridization; Yen-ta 1794 (an agronomic variety from Shansi Province) x Yen-ta R. C. 8547 (Soviet variety); stripe-rust-tolerant; winter. [Sino-Soviet 68]

Ho-tso No 1 (0678/0155); hybridization; Kai-ling No 3-142-21 x Li-hua (which is the US hybrid, Reward); stem-rust-tolerant; spring. [Cooperative No 1]

Ho-tso No 2 (0678/0155); hybridization; Li-hua (Reward) 137-8x Man-kou 335A-53; stem-rust-tolerant; spring. [Cooperative No 2]

Ho-tso No 3 (0678/0155); hybridization; Li-hua (Reward) 137-8 x Fu-lung (Huron); stem-rust-tolerant; spring.

Ho-tso No 4 (0678/0155); hybridization; Man-lou 335-531 x Marquillo (Minnesota No 2202); stem-rust-tolerant; spring.

Ho-tso No 5 (0678/0155); hybridization; parents unknown; stem-rust-tolerant; spring.

Ho-tso No 7 (0678/0155); crossbreeding; Pilot x Lan-shou (an agronomic variety from Sui-hua, Heilungkiang Province); stem-rust-resistant; spring.

Ho-tso No 6 (0678/0155); crossbreeding; Thatcher x Chao-an (5128/1344); stem-rust-resistant; spring.

Hsi-nung 6028 (6007/6593); crossbreeding; Hsi-pei No 60 (an agronomic variety) x Chung-nung 28; stripe- and leaf-rust-resistant; winter. [Western Agriculture 60-28, from contraction of names of both parents]

Hsu-chiu 438 (1776/1556); selection from agronomic variety found in Pa-i-chi, P'ei-hsien, Kaingsu Province; stripe-rust-tolerant; winter.

Hua-pei 187 (5478/0554); hybridization; Sheng-li (a Chinese in-breeding of Triumph) x Yen-ta 1817; stripe-rust-resistant; winter. [North China 187; named after the former North China Agricultural Research Institute which reportedly developed the variety.]

Hua-tung No 1 (5478/2639); hybridization; 5034 Li-ying No 1 x P223) x 5004 (Li-ying No 1 x Chung-nung 28); stripe-, leaf, and stem-rust-resistant; winter. [East China No 1, probably for East China Agricultural Research Institute, forerunner of China Academy of Agricultural Sciences Kiangsu Branch which reportedly developed the hybrid.]

Hua-tung No 4. Data same as for Hua-tung No 1.

Hua-tung No 5 (5478/2639); hybridization; 5045 (Li-ying No 1 x P225) x 5004 (Li-ying No 1 x Chung-nung 28); stripe-, leaf-, and stem-rust-resistant; winter.

Hua-tung No 7 (5478/2639); hybridization; 5042 (Li-ying No 1 x P225) x Chiang-tung-men (a Chinese agronomic variety); stripe-, leaf-, and stem-rust-resistant; winter.

Hua-tung No 6 (5478/2639); hybridization; 5042 x Chiang-tung-men; stripe-, leaf-, and stem-rust-resistant; winter.

Hun-tung No 8 (5478/2639); hybridization; 5042 x 5004 (Li-ying No 1 x Chung-nung 28; stripe-, leaf-, and stem-rust-resistant; winter.

Hunag-hsien Ta-li Pan-mang (7806/4905/1129/4721/0584/5345); selection from an agronomic variety found in Huang Hsien, Shantung Province; stripe-rust-resistant; winter. [Hunag-hsien's large grain half-bearded]

Kan-su No 96 (3927/5127); introduction; the US hybrid, Merit x Thatcher; stem-rust-resistant and leaf-rust-tolerant; spring. [Kansu Province No 96]

Li-ying No 3 (7537/5391); hybridization; Pi-yu-mai (a Chinese inbreeding of the US variety, Quality) x Chiang-tung-men; stripe-rust-resistant; winter. [Black Horse Beauty No 3]

Li-ying No 4 (7537/5391); hybridization; 20H155 x Chiang-tung-men; stripe-rust-resistant; winter.

Mai-li-to (7796/4721/1122); introduction; Merit from the US; stem-rust-resistant; spring. [Literally, "wheat kernels abundant;" also the Chinese approximation of the name of the parent variety]

Nan-ta 2419 (0589/1129); introduction; variety from Italy; stripe- and leaf-resistant; winter. [Southern University 2419]

Nung-ta 183 (6593/1129); crossbreeding; Triumph x Yen-ta 1817; stripe-leaf-resistant; winter. [Agricultural University 183, after Peking Agricultural University which reportedly developed it]

Pai-lo-t'o (4101/7482/7474); introduction; Pilot from the US; stem- and leaf-rust-resistant; spring. [White Camel; also the Chinese approximation of name of parent variety]

Pi-ma No 1 (4310/5818); hybridization; Pi-yu-mai (Chinese inbred of Quality x Ma-cha-mai (an agronomic variety); stripe-rust-resistant; winter. [Jade-green Grasshopper No 1; from contraction of names of parents]

Pi-ma No 4. Data same as for Pi-ma No 1.

Pi-yu-mai (4310/3768/7796); introduction; US variety, Quality; stripe- and leaf-rust-resistant; winter. [Green Jade wheat]

Pien-sui (2078/4482); selection from an agronomic variety from Wen-teng, Shantung Province; stripe-rust-tolerant; winter. [Flat ears]

P'ing-yuan 50 (1627/0626); selection from an agronomic variety grown in the Hsui-wu area, Honan Province; stripe-rust-resistant; winter. [The Plains 50]

San-lien No 2 (0005/5114); introduction; Noohger, origin not indicated; stripe- and leaf-rust-resistant; spring.

Shih-chia-chuang 407 (4258/1367/1641); hybridization; Triumph (US variety) x Yen-ta 1817 (an agronomic variety from P'ing-yao Hsien, Shansi Province); stripe-rust-resistant; winter. [Named after a city in Hopeh Province, probably the location of the former Hopeh Agricultural Research Institute which reportedly developed the hybrid]

Sung-hua-chiang No 1 (2646/5363/3068); introduction; Thatcher from the US; stem-rust-resistant; spring. [Sungari River No 1]

Sung-hua-chiang No 2 (2646/5363/3068); introduction; Minnesota 2761 from the US; stem-rust-resistant; spring. [Sungari River No 2]

Ting-hsien 72 (1353/4905); selection from an agronomic variety from Ting-Hsien, Hopeh Province; stripe-rust-resistant; winter.

Tsao-yang (2483/3152); introduction; the US hybrid, Early Premium; stripe-rust-resistant, stem-rust-tolerant; winter. [Early Foreign]

Yu-tzu-mai (5740/1311/7796); selection from an agronomic variety grown in the Ch'ing-feng -- Huai-yang area, Honan Province; stripe-rust-tolerant; winter. [Millipede Wheat; "mai" which means wheat may be used or dropped from the end of the name of a wheat variety]

Other information on sources of resistance to wheat rusts is presented in the paper as follows:

Resistant varieties can be used directly or as parents in breeding new resistant varieties. Although China has relatively few varieties which are resistant or immune to wheat rusts, she does have a considerable number of stem- and leaf-rust-resistant or immune varieties. Most of them have the special characteristics of Chinese agronomic varieties -- early maturity and heavy flowering, and are invaluable materials. Natural variations sometimes occur during the process of long-time breeding, thus giving rise to new resistant varieties. The sudden appearance of a leaf-and stem-rust-resistant plants among the Ch'u-hsien Pai-ho-shang-t'ou (3315/4905/4101/0735/1424/7333 literally, Ch'u Hsien white monks head) variety during the spread of stem and leaf rusts in Chiang-huai in 1958 is but one example. It is believed that further selection will soon result in a useful strain.

In the selective breeding of wheat varieties for high resistance to rusts, intervarietal (including interspecific) hybridization is as important a method as direct introduction of foreign varieties. The former method involves the choice of suitable parents. According to the foreign literature, *Triticum thimphevi* [timopheevi?] resists most physiologic races of wheat rusts, whereas most other varieties are resistant to certain races but susceptible to others. The physiologic races currently found in China's spring-wheat-growing regions are relatively few, so that it is not difficult to obtain parent material to breed new varieties resistant to them. A joint effort to evaluate the rust-resisting powers of [available] wheat varieties was conducted in the Northeast spring wheat region during 1949-1953. In the course of the program 352 resistant varieties, including 238 highly resistant ones, were identified. Of them Sung-hua-chiang No 1 (Thatcher) Sung-hua-chiang No 2 (Minnesota 2761), Mai-li-to (Merit), and Pai-lo-t'o (Pilot) have been released for growing; Li Hua (Reward), Fu-lung (Huron), and Marquillo have been used as parent in developing Ho-tso No 1 and other varieties of the Ho-tso group. The origins of the resistant varieties identified are foreign (mostly northern US), with a few exception of unknown origin.

There is comparatively less stem-rust-resistant material among the winter wheats. In 1956 and 1957, the former East China Agricultural Research Institute tested 1,975 foreign varieties and found that only the following 38 were not susceptible [to stem rust] or just slightly susceptible: 2H89, 2H92, 2H92, 2H125, 9H69, 9H75, 9H85, Aguillera, Double Cross, Pilot, Reliance, Renown, Thatcher, Warigo, Trigo, Buck LaDulc,

P224, P225, F. P. L. 142404, C. T. B., C. T. 503, C. T. 920, C. T. 922, P. C. 806-2, Ceres-Hope-Florence x H-44-Thatcher II-37 -- 35, Merit x Thatcher, Hope x Thatcher C. I. 12268, Hope x Thatcher C. I. 12043, 11291N, 144 x N, 1508, Comet X Pilot x Comet-Reliance-Hope, Ceres x Pilot, Kenred-Hard Federation-marquillo x Cheyenne-Kawvale Ks426056, Kenred-Hard Federation-marquillo x Cheyenne-Kawvale Ks426057, Marquillo-Tenmarq x Oro-Tenmarq Ks43030, Mediterranean-Hope x Pawnee Ks42522, Mediterranean-Hope Pawnee Ks425623, Tenmarq-Mediterranean-Hope Ks42508 E. [E. for Early?], Blackhull x Tenmarq Ks2739, and Nelred x Hope-Turkey 456812. Some spring wheats are among this group. Most of these resistant varieties were introduced from the central and northern states of the US, indicating that varieties from stem-rust-prevalent areas deserve consideration as possible cross-breeding material.

Southern Europe and the Central States in the US are the chief sources of known material for resistance against stripe rust of wheat, the former area providing material suitable for growing in the winter wheat areas of South China; the latter, for growing in the winter wheat areas in North China. Nan-ta 2419, Ai-li-to, and Chung-nung No 28, which were introduced from Italy, and Pi-yu-mai, Tsao-yang-mai, and Ch'ien-chiao-mai, which were introduced from the central part of the US, are a few examples of introduction now established in China. It has been verified in the winter wheat area of North China that the introductions, Sheng-li (0524/0448) [an inbreeding of Triumph], Tsao-yang, Pi-yu and Ch'ien-chiao, are important parents for hybrids. It has also been proved that the following foreign stripe- and leaf-rust-resistant varieties can be used directly in the winter wheat areas of South China: "Chieh-wei-li," "Sha-jih-hsi-a," and "Wei-erh-hsi-li-a" [Chinese approximations of three foreign names] of Albanian origin; G. Guiliari, R. Forlani, S. Pastore, Elia, and Titano of Italian origin; and "Ch'ia-erh-no-pa-te-ssu-ch'ia" [Chinese approximation of a foreign name] from Bulgaria.

Judging from the 10 years of crossbreeding experience of the former East China Agricultural Research Institute, superior results are [usually] achieved in crossbreeding for rust-resistance when individuals from the following two classes of rust-resistant materials are used as parents: (1) P223, P224, and P225. These are spring wheats native to northern US, with medium resistance to stripe rust. They are stem- and leaf-rust-resistant. Their parents are H44, Reward, Baringa x Hard Federation, and Dichlow. (2) 5034, 5040, and 5042. These are progenies of Li-hing No 1 x P223 and Li-ying No 1 x P224 crosses and have trivalent rust-resistance.

The Institute of Microbiology of the Chinese Academy of Sciences also has spent several years testing wheat varieties for reaction to rusts. The findings of that institute are as follows:

1. Stripe-rust-resistant varieties and strains: 2H Sinai, 2H, 9H, 20H125 (Coliph, from Australia), 21H104, 24H, 25H20 (Minnto d'all-ora, from Italy), C. I. 8034 Minhardi x Minturki, C. I. 3332 Mediterranean, Ks, [comma probably a misprint] Danne hybrid, Ks4 Little Panish, C. I. 12121 (Ks28), Ceres-38H x Kawvale, C. I. 12123 (Ks31) Tenmarq x Cheyenne, Ks44 Cheyenne, Blackhull, Sherman, and Extrakolben;

2. Leaf-rust-resistant varieties and strains: 25H, Gereelying, C. I. 12121 (Ks28) Ceres-38H x Kawvale, Ks44 Cheyenne, Ks4260 50 x Cheyenne-Kubanka, Ks426057, 56 x Cheyenne x Kubanka, Ks43634 Marquillo-Tenmarq x Aro-Tenmarq [Aro-Tenmarq?], Ks83 C. I. 11979 Marquillo x Aro [Aro?], Ks 425623 Ks 43027, Ks43631, Ks44730, Ks424393 Hope-Hussar, Ks434402, and II-36-26 Marmin-minihardi x H44-Mintsk;

3. Stem-rust-resistant varieties and strains: Ks4260, 56 x Cheyenne-Kubanka, Ks4260 57 x Cheyenne-Kubanka, Ks525603 Med-Hope x Pawnee, Ks425622 Med-Hope x Pawnee, Ks434402 Hope-Hussar, Ks425811 Nebred x Med-Hope, and II-36-26 Marmin-minihardi x H44-Mint.

During 1957-1958, the Institute for Plant Protection of the China Academy of Agricultural Sciences tested foreign materials for reaction to wheat rusts. Some stripe- and leaf-rust-resistant varieties and strains identified were: Nebred x (Com. x Med-Hope) A703 and 50 other [related strains], Ceres 38H, Yen-ta R. W., all from the US; C. V. Rieti, from Italy; Weigen mont-calme, from Switzerland; 21-4-F4, from Bulgaria; and Skoro-spelka-137, from the USSR.

It is apparent from the above information that the principal sources of resistance against stem and leaf rusts are found in the northern part of the US, southern Europe, and the USSR, since those are the areas where stem and leaf rusts of wheat are most prevalent. By the same token, important sources of stripe-rust-resistance may also be found in southern Europe. Moreover, since many spring wheats show some resistance to rusts, a collection of varieties derived from spring wheats might yield better plant material [than presently available for the breeding of stripe-rust-resistant varieties.

Concerning the testing of Chinese agronomic varieties of wheat for resistance to rusts, the paper gives the following information:

Since liberation, the former regional and provincial agricultural research institutes as well as other research groups throughout the country have conducted tests designed to type [all] Chinese agronomic wheat varieties according to their ability to resist wheat rusts. Susceptible, escape, tolerant, resistant, and immune types have been identified. It has been found that the most common types among the Chinese agronomic varieties are those that escape rust infection and damage because of early maturity and those that show tolerance by enduring a slow course of infection while maintaining a definite level of productivity.

Based on studies conducted by the North China, East China and Northwest agricultural research institutes, there are not many agronomic varieties resistant or immune to stripe rust and very few if any resistant to stem rust. For instance, in 1955, the former Northeast Agricultural Research Institute tested a total of 207 varieties and found 1.5 percent of them immune, 9.2 percent highly resistant, 22.2 percent moderately resistant, 50.2 percent moderately susceptible, and 16.9 percent very susceptible. Moreover, it was found that there were more varieties resistant to stripe rust than to leaf rust and none resistant to stem rust. These results found corroboration in tests conducted at the former North China Agricultural Research Institute and by scientist Fang Chung-ta (2455/00a2/6671).

Studies conducted by the former North China Agricultural Research Institute and by the Institute of Crop Breeding and Cultivation, China Academy of Agricultural Sciences indicated that more stripe-rust-resistant and leaf-rust-resistant varieties are distributed in the southern provinces than in the northern province. Wa-wei-lo-fu [Chinese approximation of a Russian name], who tested the USSR Chinese wheat varieties for resistance to leaf rust, arrived at the same conclusion.

In 1958, the former Northwest Agricultural Research Institute conducted tests for rust resistance in its elementary materials nursery and found a small percentage of immune varieties and many (about 250) with varying degrees of resistance. Some researchers in that agency believed that the increase in 1958 of rust-resistant agronomic varieties was related to recent variations in the rust-producing microorganisms in the Sensi area; however, the idea has yet to be confirmed by further research.

From 1949 through 1953, research units in the northeastern part of China, particularly in Kung-chu-ling, Chia-mu-ssu, K'o-shan, Harbin, and Mukden, engaged in a joint program of field and hothouse testing of a large number of wheat varieties. Two spring wheats, Yu-fu Hsiao-mai and Ch'eng-tu Kuang-t'ou, were found to be highly resistant to rust.

Listed alphabetically below are the names of a few Chinese agronomic wheat varieties and their reported reactions to wheat rusts. Numbers in parentheses refer to telegraphic code numbers for the ideographic portion of the name; information in brackets is its FDD interpretation.

Ch'ang-shu-chin-lu-ch'u-t'ou (1603/3578/4868/0362/2691/7333) [always maturing with just six heads], stripe-rust-resistant.

Che-chiang Kuang-t'ou (3181/3068/0342/7333) [Chekiang Province Bald], stem-rust-tolerant.

Ch'eng-tu Kuang-t'ou (2052/6757/0342/7333) [Ch'eng-tu baldhead], rust-resistant.

Ch'i-hsien Ta-pai-mang (0370/4905/1129/4101/5345) [great white-awn from Ch'i Hsien], stripe-rust-susceptible.

Ch'i-t'ou-pai (7871/7333/4101) [flat-head white], stripe-rust-tolerant.

Ch'u-hsien Pai-ho-shang-t'ou (3315/4905/4101/0735/1424/7333) [white monk's head from Ch'u Hsien], leaf-rust-resistant.

Fan-ch'ang Hu-nan (4907/2490/3275/0589) [place names], stripe-rust-resistant.

Heng-shui Ta-pai-ling (5889/3055/1129/4101/1545) [great white peak from Heng-shui Hsien Hopeh, Province], stripe-rust-susceptible.

Hsiu-ning Ch'an-pu-ch'i (0128/1380/0008/2978) [variety from Hsiu-ning, Anhwei Province, unknown to locusts, stripe-rust-resistant.

Hsu-chou 438 (1776/1558) [place name], rust-tolerant.

Hua-nung No 5 (5478/6593) [China Agricultural No 5], susceptible.

Kuei-ch'ih Pai-k'o Tzu-kan-tzu (6311/3069/4101/3011/4793/2731/1311) [white hull, purple straw of Kuei-ch'ih, Anhwei Province], stem-rust-tolerant, leaf-rust-resistant.

Li-yang Yu-mang-tsao (3303/7122/2589/5345/2483) [bearded early from Li-yang, Anhwei Province], stem-rust-tolerant.

Ma-cha-mai (5818/5741/7796) [Millipede wheat], rust-tolerant.

Ming-hsien 169 (6900/6343) [engraved virtue], susceptible.

Nan-ling Hop'u-t'ou (0589/7117/4421/5543/7333) [grain from rushes of Nan-ling, Anhwei Province], stripe-rust-resistant.

Pei-hsi No 3 (0554/4762) [Northern Line No 3], susceptible.

Shen-hsien Ta-mang-mai (3234/4905/1129/5345/7796) [great bearded wheat from Shen Hsien, Hopeh Province], susceptible.

Shih-t'e 14 (4258/3676) [Shih-chia-chuang (in Hopeh) Special 14], rust-tolerant.

Ssu-yueh-huang (0934/2588/7806) [four months yellow], susceptible.

Ting-hsien 72 (1353/4905) [place name], rust-tolerant.

Tsao-ch'iang Ta-pai-mang (2976/1730/1129/4101/1545) [great white bearded from Tsao-ch'iang Hsien, Hopeh Province], stripe-rust-susceptible.

Tung-tsao-wu-t'ien (2639/2483/0063/1131) [Eastern early 5 days], stripe-rust-resistant.

Wu-chin Ch'e-chien-tzu (2976/6651/6508/7035/1311), stripe-rust-resistant.

Wu-chin Pai-mang (2976/6651/4101/5345) [white awn from Wu-chin, Kiangsu Province], stripe-rust-resistant.

Wu-hsi Yu-mang-fang-lu-ch'u (2477/6932/2589/5345/2455/0362/2691) [awn, square-headed, and six pillars from Wu-hsi, Kiangsu Province], stripe-rust-resistant.

Wu-hsien Pai-ssu-kua (0702/4905/4101/4828/3900) [white luffa from Wu-hsien, Kiangsu Province], stripe-rust-resistant.

Yen-ta 1885 (3610/1129) [Yenching University 1885], susceptible.

Yu-fu Hsiao-mai (2589/4421-1318/1420/7796) [wheat with gluten (or bran)] a spring wheat highly resistant to rusts.

Yu-lin-pai (7625/7673/4101) [fish scales white], susceptible.

Yu-tzu-mai (5740/1311/7796) [locust wheat], rust-tolerant.

China's major achievements since liberation in the selective breeding of rust-resistant varieties of wheat are summarized under three points as follows:

1. Promotion of extensive and intensive selection of rust-resistant varieties as a popular endeavor on a nationwide scale determined the degree of resistance of many introductions. As a result, many tolerant and resistant varieties were released for growing. Before the rust-tolerant property of P'ing-yuan 50 was discovered in 1950, that variety was grown in not more than 40,000 mou in Honan Province, but by 1955 the acreage in P'ing-yuan 50 wheat had exceeded 3 million mou, extending through Honan, Hopeh, and Shantung Provinces. In 1949, stripe-rust-resistant Pi-ma No 1 was grown in only 264 mou, but in 1958 it was released for growing in 70 million mou of China's principal winter wheat region (s). Similarly, total acreage in stripe- and leaf-rust-resistant Nan-ta 2419 has exceeded 30 million mou by 1958.

2. Undertaking of large-scale regional tests for the cultivation of improved varieties in order to expand their growing areas. Varieties which had already been released for growing in limited areas such as Nan-ta 2419 wheat, Pi-yu wheat, and Ai-li-to wheat were included in the studies. Other newly developed, improved varieties which had not been released [prior to the beginning of the decade] were also tested. Among them the following have become the most important varieties in the country today: the winter wheats, Pi-ma No 1, Pi-ma No 4, Hsi-nung 6028, Tsao-yang, Chung-su 68, and Li-ying No 3; and the spring wheats, Kansu No 96, Ho-tso Nos 1-7, Sung-hua-chiang Nos 1 and 2, Mai-li-to, and Pai-lo-t'o.

3. Some outstanding achievements were realized from the full-scale breeding throughout the country of new rust-resistant varieties to meet the ever increasing needs of production. For example, Peking Agricultural University developed the rust-resistant varieties known as Nung-ta 36, Nung-ta 90, Nung-ta 183, and Nung-ta 498; the former North China Agricultural Research Institute, Hua-pei 672 and Hua-pei 187; the former Northwest Agricultural Research Institute, Shih-chia-chuang 407. All the above-mentioned improved varieties are specifically resistant to stripe rust and suitable for growing in the winter wheat region(s) of North China. Those among them which have already been released are Nung-ta 183, Hua-pei 187, Hsi-pei 134, Hsi-pei 612, and Shih-chia-chuang 407. A few other monovalent and trivalent rust-resistant varieties which have been developed are: Tung-pei Nos 1, 3, 4, 5, 6, 7, 8, and 10, which were selectively bred by the China Academy of Agricultural Sciences Kiang-su Branch; Anhwei Nos 1, 2, 3, 4, and 8, which were selectively bred by the former Anhwei Provincial Agricultural Experiment Station; and Hua-chung Nos 1, 4, and 7, selectively bred by the former Central China Agricultural Research Institute.

In a section on the inheritance of rust resistance and problems encountered in selection and breeding for rust resistance the following information is given:

In the crossbreeding and selection of wheat varieties for resistance to rusts, the use of parental plants with high degree of resistance is important as rust-resistance is a hereditary characteristic. This was demonstrated by Chao Hung-chang (6329/3163/3864) and others in their work on the hybridization of wheat at five farms in Shensi Province. They derived the highly stripe-rust-resistant varieties, Pi-ma Nos 1-4 and Hsi-pei-chan No 1 (5478/0554/4541) [literally, Northwest Station, probably for Northwest Agricultural Experiment Station] from crosses of Ma-cha-mai x Pi-yu-mai [Chinese line of Quality]. They also derived Hsi-pei-chan No 2 from a Ma-cha-mai x Chung-nung 28 [Chinese line of 25H112, originally from Italy] cross; both Ching-hui Nos 501 and 506 (3193/8409) [named after a creek in Shensi Province] from Hsi-pei No 60 x Pi-yu-mai; Hsi-nung 6028 from Hsi-pei No 60 x Chung-nung 28, both Ta-li

Nos 1 and 2 (1129/5408) [named after Ta-li Hsien, Shensi Province] from Ta-li No 52 x Pi-yu-mai, and Hsi-nung Hung-yu-mai (6007/6593/4767/3769/7796) [literally, west agricultural red jade wheat; also a contraction of the names of both parental plants] from Hung-ho-shang (4767/0735/1424) [red monk] x Pi-yu-mai. These hybrids are also highly resistant to stripe rust.

The inheritability of rust-resistance is today a widely accepted fact. The problems plant breeders are concerned with now are how the character for resistance is inherited and how to stabilize and improve this heritable resistance so that the improved varieties will more adequately meet the needs of production. China has not done much work in these respects. But in 1955 Ts'ai Hsu (5591/2491) and his colleagues made the following observations in summing up the results of their several years' research in the hybridization of wheat:

1. Immune plants may be found among the progeny of a cross only if at least one of the parents has the immune character. The offspring of parental plants with only slight resistance to rusts will vary between susceptible and slightly resistant in their reaction to the disease, but there will be immune individuals among them.

2. In hybrid combinations where Pi-yu-mai is used as a parent, the following conditions prevail: the rust-resistance of the first filial generation (F_1) is dominant. The F_2 segregates into immunes and susceptibles, mostly the former. The F_3 in some lines are all immune; in other lines, all susceptible. In most lines the F_3 consists of both immune and susceptible individuals. Immune individuals must be selected from among the F_2 in order to produce an all immune F_3 . F_2 individuals that give a 2-4 plus reaction to wheat rust produce offspring (F_3) which rarely, if ever, give rise to an immune line. These observations emphasize the importance of using immune parents in crossbreeding for rust-resistance.

The former North China Agricultural Research Institute in cooperation with the former Hopeh Provincial Agricultural Research Institute, conducted some studies on the inheritance of rust-resistance in wheat. Reciprocal backcrossing tests were conducted involving hybrid combinations such as Shih-t'e 14 x Sheng-li [Chinese line of Triumph] and Shih-t'e 14 x Shih-chia-chuang 407, respectively. The following "important" genetic principals were revealed in those studies:

1. It was found that in reciprocal tests for a single hybrid combination, the segregation ratios of the third filial generations (F_3) were about the same regardless of which strain was the recurrent parent of F_2 . Judging from these observations, concurrent reciprocal tests in alternate backcrossing for rust-resistance was deemed unnecessary.

2. When varieties with different degrees of resistance were crossed, it was found that most of F_1 would have resistance if one of the parents was immune, and 65-75 percent of F_2 would also be immune. Most recessive combinations produced second filial generations consisting of 20-25 percent immune and about 50 percent "intermediates" [probably meaning intermediate between immune and susceptible].

3. Among the immune plants in F_2 , some showed susceptibility to rust in a single stem, in the lower leaves, or in the late stages of growth. But their succeeding generation (F_3) segregated as follows: The offspring of the single-stem-susceptible plants and those of healthy plants showed no noticeable difference. Those which were attacked in the lower leaves produced a considerable percentage (49.4-66.6 %) of immune offspring although less than did the healthy plants (76.6%).

4. A considerable number of immune plants may be derived from the highly rust-resistant progeny of the hybrids (F_1), but very few immune will segregate out of the susceptible progeny.

Chinese farmers have long known to take advantage of natural variations in the selection of rust-resistant wheat varieties. By this procedure the former East China Agricultural Research Institute discovered a stem-rust-resistant plant of the Chung-nung No 28 variety in tests conducted during 1954-1955. [It was propagated.] As of 1959, it was still resistant to stem rust and in that respect different from the original [stripe-rust-resistant] Chung-nung 28 variety. In 1956, the same institute selected single plants of the 5204 and Li-ying No 3 varieties which bore full ears and were only slightly attacked during an epidemic of stem rust. Tests run in 1957-1958 showed that progenies of these respective strains had retained their stem-rust-resistance.

In 1956, the former North China Agricultural Research Institute selected a few individual plants of the Hsi-nung 6028 variety in Shih-chia-chuang, which plants had shown resistance to a rust-fungus complex [prevalent] in Shih-chia-chuang. The following year, the progeny of the selections were tested by artificial inoculation. Two rows of wheat did not fall prey to rust. Ten plants were selected from the next generation in 1957. Their offspring were tested in 1959 with the following results: 6 rows immune, 3 rows moderately attacked, and 1 row severely attacked. These results indicated the possibility of selecting resistant plants from a susceptible variety, in which case continual selection would be imperative since such selections tend to segregate in subsequent generations.

Chinese research on the inheritance of rust-resistance has just begun. Many problems encountered in the practice of selection procedures have not been solved. Experience has shown that the sexual crossing of

a local variety with an introduced resistant parent is a reliable method in the selection and breeding of high-yielding, rust-resistant varieties. But whether a local variety as one of the parents is absolutely necessary needs further study. Chinese experience has proved that the use of a local variety is a quick way to develop a hybrid adapted to a local cultural conditions and having several types of resistance. But in severely infected areas the use of introduced varieties (both Chinese and foreign) as both parents should be considered.

For the hybridization of wheat with rust-resistance, the former Northwest Agricultural Research Institute recommended using parents which are either simultaneously resistant or each resistant in a different stage of growth so that the resistant character will not be lost so easily.

Crossbreeding [of wheat] in China is still limited to rather simple hybrid combinations and directed towards the development of improved varieties which will resist many races and types of rust (as well as other diseases) under a variety of conditions and which will be desirable material for polyhybrids. Purposeful breeding of multiple crosses accompanied with selection is expected to yield a variety with stable and polyvalent rust-resistance. The procedures used in testing filial generations are also important.

A list of references consisting of 16 Chinese papers is presented.

EPIDEMIOLOGY OF WHEAT RUSTS STUDIED -- Peiping, Chung-kuo Chih-wu Pao-hu K'o-hsueh (Plant Protection Science in China), Science Publishers, 1961, pp 265-291

[The following is an abstract of a paper entitled "Epidemiology of Wheat Rusts in China and Methods of Control," by Lu Shih-i (7120/1597/5030) and Pan Jen-jui (3382/0088/3843), Institute of Microbiology, Chinese Academy of Sciences. Chinese Telegraphic Code numbers in parentheses are provided for the ideographic portion of the name of a wheat variety if the code numbers for that variety do not appear elsewhere in this report (i.e., SIR).]

The article reviews the major outbreaks of wheat rust in China since 1950, noting that systematic surveys of the disease have been conducted in the past decade under the guidance of the party and government. Epidemiological features based on those surveys, such as atmospheric spore counts, climatic and cultural factors, geographic analyses of areas affected by the various types of wheat rust, and the findings of individual Chinese scientists and research agencies regarding the estivation and hibernation of the pathogens, etc., are discussed in separate sections. Also presented are China's current methods of prognostic analysis and forecasting, including the use of Soviet scientist Shih-chieh-pan-no-fu [Chinese approximation of Russian name, probably Shcherbinov or Shcherbinov'skiy]'s formula for the calculation of length of incubation period:

$$\text{incubation period} = \frac{124}{\text{mean temperature } -24}.$$

Chinese research and practice in the control of wheat rusts by selection and breeding of resistant varieties, by application of proper cultural techniques, and by the use of chemicals is discussed.

As reported, since liberation the control of wheat rusts has been effected in many areas by selection and breeding of rust-resistant varieties and subsequently releasing them for growing. Certain rust-resistant or tolerant varieties are grown in each specific wheat region. For instance, along the Yangtse and Yellow River basins, the spread of stripe rust has been limited to relatively small areas because the following varieties were released for growing there: Nan-ta 2419, Pi-ma No 1, P'ing-yuan 50, Yu-p'i (3768/4122) [jade chaff], Ai-lito, and Tsao-yang-mai. In the Northwest region, where the principal concern is stripe rust, the following resistant varieties are cultivated: Hsi-nung 6028, Nan-ta 2419, Hsi-pei 612, Hsi-pei 134, and Hsi-pei-chan No 2.

Stripe-rust-resistant varieties grown in the north-central part of the North China region are Tsao-yang-mai, Ch'ien-chiao-mai, T'ai-ku No 49 (1132/6253), Hua-pei 187, Nung-ta 183 and 403, Pi-ma No 4, Shih-chia-chuang 407, Hsi-pei No 54, Hsi-nung 6028, Nan-ta 2419, Pai-yu-p'i (4101/3768/4122) [white jade chaff], Huang-hsien Ta-li Pan mang, Ssu-shui San-pa-mai (3123/3055/0005/0360/7796), Chung-nung 28, and P'ing-yuan 50.

Improved varieties grown in the southern part of the North China [wheat] region where stem and leaf rusts are prevalent are: Tsao-yang-mai, Che-chiang Pai-p'u-mai, Hua-tung 282, Hua-tung 309, Hua-tung 5402, Chi-li-mai (0679/0448/7796), and Wan-nung Nos 1-4 (4111/6593) [Anhwei Agricultural...].

Nan-ta 2419, Ai-li-to, and Chung-nung 28 are grown in the Central China Region which is mainly concerned with resistance to stripe and leaf rusts. In the Southwest region the stripe-rust-resistant varieties grown are [Nan-ta] 2419, 51 Wheat, and Shan-nung 205 (1427/6593); the stem-rust-resistant variety, Chin-ch'iu (6855/3808); and the leaf-rust-variety, 37-1109.

Stem-rust-resistant varieties varieties grown in the Northeast spring wheat region are: Ho-tso Nos 1-7, Kansu No 96, Mai-li-to, Sung-hua-chiang Nos 1 and 2, and Pai-lo-t'o; in the North China Inner Mongolia spring wheat region: Kan-su No 96, San-lien No 2 (0005/5114), and [Nan-ta] 2419; in the Northwest spring wheat region: Kan-su No 96, No 60, Pai-yu-p'i, No 774, 30088, and 2416.

Many rust-resistant varieties have been obtained by selection of agronomic varieties, by introduction of varieties of known resistance, by sexual and asexual crossbreeding and by directed breeding. Pai-yu-p'i is an example of a Chinese variety derived from the selective [in] breeding of a rust-resistant variety introduced from abroad. Others are San-lien No 2, Pai-lo-t'o, and Mai-li-to.

The Hsi-pei 54 variety was developed by asexual crossbreeding. The spring varieties Hsu-chou 438, Che-chiang-nung No 9 (3181/3068/6593) [Chekiang Province Agricultural...], and 487 were selected as resistant plants of susceptible varieties when they were not affected by invasions of stripe rust.

Chinese scientists are also currently engaged in the development of new resistant varieties by distant hybridization and by artificial modification of environment.

As for chemical control research and practice, it is reported that fragmentary research was conducted in China prior to 1958. Those early studies confirmed the efficacy of sodium fluorosilicate and sodium fluoride in the control of stripe rust and that of lime-sulfur in controlling three types of rust. Since then a host of indigenous materials have been screened according to protocol formulated in 1959. During the past 2 years, in hothouse and field experiments, many foreign and indigenous materials were tested for effect against wheat rusts. Lime-sulfur preparations, colloidal sulfur, barium polysulfides, salt water and refuse tea, atlantus bark, and Lycoris were found to be good protective fungicides. Sulfanilic acid and its sodium salts, calcium sulfamate, ammonium sulfamate, sodium fluosilicate, and sodium floride were found to be good fungicides for use on infected plants. A highly effective therapeutic agent called "Pao-mai-ning" (0202/7796/1380) is being manufactured. Systematic studies conducted at the Institute of Microbiology, Chinese Academy of Sciences on the mode of action

of sulfanilic acid in the treatment of wheat rusts have elucidated the way in which the chemical suppresses the antagonism of the rust fungi. In addition, remarkable results were obtained in the use of sodium fluoride solution and ammonium sulfate water as herbicides to control the spread of the plant hosts upon which the rust fungi hibernate. That institute also found certain *Actinomyces* and their antibiotic products to be very antagonistic to rust fungi.

The USSR has made preliminary achievements in the use of chemical immunizing agents to treat seeds or spray the plants in order to enhance their resistance to wheat rusts. In China several sulfonic acid as well as thiocyanic preparations which were found to be effective therapeutic agents are being considered as prospective chemical immunizing agents.

The author gives a list of 48 references, mostly Chinese works published since 1950. Sixteen of them are given below.

1. "Ministry of Agriculture Holds Symposium on Wheat Rusts in Peiping," [unsigned], Nung-yeh K'o-hsueh T'ung-hsun [Agricultural Science Bulletin], Vol 2, No 8, 1950, pp 29-30
2. "Report on the Symposium on the Research Effort Relative to Wheat Rusts Convened by the Academy of Agricultural Sciences," [unsigned], Chih-ping Chih-shih (Phytopathological Information), Vol 1, No 4, 1957, p 46
3. "Summing Up the Wheat Rust Research Symposium," [unsigned], Chih-ping Chih-shih, Vol 3, No 10, 1959, pp 217-219
4. "Determination of the Resistance of Wheat Varieties of Stripe, Leaf, and Stem Rusts--1949," by Pu Mu-hua (0592/1970/5478) and Kan K'uei (3927/7503); Hua-pei Nung-[yeh] K'o-[hsueh Yen-chiu]-so Yen-chiu Chuan-k'an (North China Agricultural Research Institute Research Monographs), No 1
5. "Notes on Experimental Studies on Several Major Diseases and Their Control of Wheat," by Northeast Agricultural Research Institute; Chih-ping Chih-shih, Vol 2, No 4, 1958, pp 216-222
6. "On the Appropriate Time for Applying Chemicals in the Control of Stem Rust of Wheat," by Fang Chung-ta (2455/0022/6671); Hua-tung Nung-yeh K'o-hsueh T'ung-pao (East China Agricultural Science Bulletin), Nos 2-3, 1959, pp 68-69
7. "The Epidemiology of Wheat Rusts in China, Their Control, and Problems Encountered in Research Work," by the Institute of Plant Protection, China Academy of Agricultural Sciences; Chih-ping Chih-shih Vol 2, No 4, 1958, pp 222-228

8. "Studies on the Epidemiology of Stripe Rust of Winter Wheat in North China," by Ch'en Shan-ming (7115/0810/6900), Chou Chia-p'ing (0719/0857/1627), Li Jui-pi (2621/3843/4310), Wang K'o-ning (3769/0668/1380), et al.; Chih-wu Ping-li Hsueh-pao (acta Phytopathologica Sinica), Vol 3, No 1, 1957, pp 63-85
9. "Preliminary Epidemiological Studies on Stripe Rust of Wheat in Shensi-, Kansu, and Tsinghai Provinces," by Li Chen-ch'i (2621/2182/2978) and Liu Han-wen (0491/3352/2429); Hsi-pei Nung-hsueh-yuan Hsueh-pao (Journal of Northwest Agricultural College), No 4, 1956, pp 1-8 and No 1, 1957, pp 33-46
10. "Effects of Light and Temperature on Stripe-Rust-Resistance in Wheat Varieties," by Lu Shih-i (7120/1597/5030) and Li kao-hsiang (7812/5221/5046); Chih-wu Ping-li Hsueh-pao, Vol 4, No 2, 1958 pp 129-136
11. "Studies on the Stripe Rust Fungi of Wheat and Paddy Rice," by Lu Shih-i, Yang Tso-min (2799/0155/3046), Wu Wei-chung (0702/4850/0022), et al.; Chih-wu Ping-li Hsueh-pao, Vol 4, No 2, 1958, pp 137-144
12. "Considerations for the Control of Stripe Rust of Wheat in the Winter Growing Region of Hopeh Province," by Chi Liang (1323/5328); Chih-ping Chih-shih, Vol 2, No 4, 1958, pp 228-233
13. "Reports of Research Work for Control of Wheat Rusts in Manchuria, III: Correlation Between Cultural Conditions and Occurrence of the Disease, Chemical Control Experiments, and Conclusions," by Tseng Kuang-jan (2582/0342/3544), Wang Ch'uan (3769/2938), Huang Kuei-ch'ao (7806/2710/3390), et al.; Tung-pei Nung-yeh K'o-hsueh T'ung-pao (Northeast Agricultural Science Bulletin), No 4, 1956, pp 33-38
14. "Survey Report on Outbreaks and Control of Stem Rust of Wheat in Anhwei During 1958," by Anhwei Department of Agriculture; Chih-ping Chih-shih, Vol 2, No 4, 1958, pp 202-216
15. "Several Points Learned from the Close Planting of Wheat," by Yang P'ei-yuan (2799/1014/0954) and Liu Hsi-shan (0491/6932/1472); Nung-yeh K'o-hsueh T'ung-hsun (Agricultural Science Bulletin), No 7, 1953, pp 281-284
16. "How Fall Wheat Seedlings Were Hit by Leaf Rust in the Peiping Hung-ch'i People's Commune During 1958," by the Agricultural Research Institute of the Hung-ch'i People's Commune, Peiping in conjunction with the Peking Comprehensive Group of the Biology Department, Chinese Academy of Sciences and the Institute of Microbiology; Chih-ping Chih-shih, Vol 3, No 2, 1959, pp 34-37

RUST-RESISTANT VARIETIES OF WHEAT DEVELOPED IN NORTHEAST CHINA -- Peiping,
Kuang-ming Jih-pao, 5 Apr 62, p 2

[Numbers in parentheses are Chinese Telegraphic Code
numbers for the ideographic portion of the Names of wheat
varieties.]

Three new varieties of spring wheat will be released after three years of regional testing by research personnel in the fields of plant breeding and plant protection. The three varieties are known as "ts'ao-yuan No 1" (5430/0626) ["Pairie No 1"], "Ts'ao-yuan No 2" ["Prairie No 2"], and "Feng-Ch'iang No 1" (0023/1730) [literally, "Plump, Vigorous No 1"]. These new varieties are more rust-resistant than previous varieties. During 1962, these three new varieties will be released for growing in the important wheat producing areas of Northeast China.

The most serious hazard to wheat production in Northeast China is stem rust. The Kirin Branch Academy of Agricultural Sciences (formerly the Northeast Institute of Agricultural Sciences) has as its most important duty the development of rust-resistant varieties of wheat. During the past decade or so, some other varieties tolerant of heat and dampness, and resistant to rust were developed; these were designated as "Ho-tso No 1-7" (0678/0155) ["Cooperative No 1-7"].

The three new varieties of wheat were derived from the hybridization of spring wheat varieties released since 1949. Experiments on the new varieties of rust-resistant spring wheat have involved test planting in the arid areas of Inner Mongolia, areas of Heilungkiang Province with heavy rainfall, and in the Sung-Liao Plain [i.e., the plain of the Sungari River and the Liao Ho river valleys]. From these experiments, the variety best suited to each area's natural conditions was selected.

In order that these new varieties might speedily be put into production, the research units emphasized seed propagation. Technicians from basic level productive units were sent to demonstration breeding farms to observe the new varieties being propagated. After the new strains are released, the leaders of the three provinces of Northeast China will send personnel to state farms and people's communes to determine the reactions of the masses to the new varieties and to conduct surveys that might further aid research workers in improving the breeding of wheat.

WHEAT SEEDS TREATED TO COMBAT NEMATODES -- Peiping, Chung-kuo Chih-wu Pao-hu K'o-hsueh (Plant Protection Science in China) Science Publishers, Sep 61, pp 255-263

[The following is a summary of Part III of an article, "Wheat Nematode Disease and Its Prevention," by Chu Feng-mei (2612/7685/5019) and Tu Hsiu-ming (2629/4423/5551), both of the Kiangsu Branch, China Academy of Agricultural Sciences.]

Seed treatment is a practical way of combating wheat nematodes; some of the methods used are as follows:

1. Sifting. This method eliminates, at most, 85 percent of the galls.

2. Winnowing. The ordinary winnowing machine is able to remove only 29.3 percent of the infected seeds; best results are achieved using a special high-speed winnowing machine.

3. Wet Treatments. This method involves the use of salt water, pure water, slurry, or ammonium sulfate solution. Brining, although very effective, is too expensive because of the high concentrations (over 20 percent) of salt required. The method is complex, and furthermore, it requires that the seeds be planted immediately after treatment. The pure water method is too time consuming and complicated. For the slurry method, the Shantung Institute of Agricultural Sciences suggests the use of slurry containing 40-45 percent mud. The Chia-mu-szu Agricultural Experiment Station, Heilungkiang [Province], obtained efficiencies of up to 98.1 percent using slurry containing 25 percent mud. The ammonium sulfate solution method is economic because the solution used can be afterwards applied to the fields for the purposes of fertilization and irrigation. The Peiping Institute of Agricultural Sciences increased yields from 1 to 11 percent using this method. A 13 percent solution of ammonium sulfate is sufficient to eliminate the nematodes; best results are obtained with a 26 percent solution.

4. Chemical and Heat Treatments. The Kansu Agricultural Experiment Station has found that arsenious oxide is completely effective against both nematode disease and wheat bunt. Its use is simple, involving the addition of only 0.2 percent of arsenious oxide per unit weight of seed. The Kansu Province experiments were carried out in 1952-54. In 1952 and 1954 the arsenious oxide was completely effective; in 1953, it was 99.92 percent effective. The incidence of nematode disease in the control fields during the three years were 83.90 percent, 22.47 percent, and 20.81 percent, respectively.

The East China Institute of Agricultural Sciences conducted experiments during 1953-1954 on the comparative effectiveness of Ceresan and various arsenic compounds. A 0.1 percent concentration of arsenites and a 0.2

percent concentration of "Chung-nung" calcium arsenate were found to be more effective than either the 0.2 percent concentration of Ceresan or the 0.2 percent concentration of lead arsenate. The institute also discovered that if the soil is not sufficiently moist and the temperature is greater than 25 degrees centigrade, care must be exercised that the concentration of nematocides does not exceed 0.01 percent.

Chinese research has shown that nematodes cannot live at temperatures greater than 45 degrees centigrade, generally speaking. Since, however, the adaptability of the nematodes is unpredictable, the steam treatment involves certain difficulties. Observations made at the Chia-mu-szu Agricultural Experiment Station reveal that the ability of the nematodes to survive under low-temperature conditions varies significantly with soil moisture.

5. Mechanical Sorting. Efficiencies of 99.3-100 percent have been achieved through the use of a mechanical sorter designed by the authors. The machine sifts out the smaller and rounder galls from the wheat seeds using a revolving drum. The machine requires only two persons to operate it; it is capable of handling 1,200-1,600 chin per day when made of wood or 500-1,000 chin per hour when made of metal.

WATER-SOAK TREATMENT USED TO DISINFECT CEREAL SEEDS -- Peiping, Chung-kuo Chih-wu Pao-hu K'o-hsueh (Plant Protection Science in China), Science Publishers, Sep 61, pp 69-109

[The following are extracts from an article, "The Disinfection of Rice and Wheat Seeds by the Water-Soak Treatment," by Chu Feng-mei (2612/7685/5019), Tu Hsiau-ming (2629/4423/5551), Ch'en Yu-ling (7115/3022/5376), Hsi Wen-ying (1153/2429/5391), Wang Fa-ming (3769/3127/2494), and Li Ching-i (2621/4842/0308), all of the Kiangsu Branch, China Academy of Agricultural Sciences.]

Infestation of the seeds of domestic rice, wheat, barley, and oats is a serious problem in China. Infestation of paddy rice grains in the Peiping area has run as high as 98.5 percent. Infestation in the Brachyspore areas of Yunnan Province ranges between 4.5 and 17.26 percent. In Chekiang Province, 66 hsien are infested with "Kan-chien hsien-ch'ung" [1626/1423/4848/5722; literally, "stem-spike nematode"]. In Ch'eng-tu, Szechwan Province, mold has developed on 92 percent of the rice plants.

The East China Institute of Agricultural Sciences has observed the following microorganisms infesting rice in Kiangsu Province: Piricularia, Phoma, Brachysporium, Trichomonis, Helminthosporium, Fusarium, Alternaria, Nigrospora, Sporotrichum, and Hormodendrum.

The most serious problem as regards wheat is the existence of nematode galls and smut balls. Studies by the East China Institute of Agricultural Sciences revealed that 19 percent of the 3,803 strains of wheat studied contained nematode galls and 13 percent contained grain infested with wheat bunt.

Of the 2,915 strains of barley studied by the institute, 31 percent were infested with *Ustilago hordei*; about 25 percent of the 515 strains of oats were infested with *Ustilago levis*.

Molds were found on 91.6 percent of the barley studied by the North China Institute of Agricultural Sciences in 1950 and on 38.1 percent of the wheat. Liu Shu-ching (0491/3219/7234), of Northeast Agricultural College, found that 9.4-63.9 percent of the wheat in the Northeast were infested with *Helminthosporium sativum*. The average rate of infestation was 26 percent.

The East China Institute of Agricultural Sciences collected 257 strains of wheat from Shantung, Kiangsu, Anhwei, Chekiang, and Fukien Provinces in 1953. Of these, 77 percent were infested with *Helminthosporium sativum*; *Fusarium* infestation averaged 10 percent but sometime reached as high as 30 percent. Kiangsu and Chekiang Provinces suffer most seriously from *Fusarium* head blight. Kiangsu and Anhwei Provinces are affected most seriously by infestation with *Helminthosporium*. Other molds found included *Alternaria*, *Chaetomella* and *Penicillium*.

III.

In general, five types of seed treatment are being used extensively in China.

1. Mechanical Separation. This method involves the use of a mechanical seed separator, the "nematode eliminator." This machine is 100 percent effective and, according to the North China Institute of Agricultural Sciences, increases yields by 5 percent. However, this machine is unable to eliminate infestations caused by microorganisms or to eliminate infested seeds whose length and size is similar to that of healthy seeds.

2. Weight Differentiation. According to studies made in the I-tu, Wen-teng, and P'ing-yuan areas, all in Shantung Province, wet treatment of wheat seeds was generally 100 percent effective against sheat bunt.

3. Heat Treatment. The constant-heat water-soak method has been able to reduce the incidence of smut from 7-20 percent to 0.2-2 percent while increasing yields 10 percent. Recently, the Chekiang Provincial Institute of Agricultural Sciences has been promoting extensive use of the cold water-soak -- sun-drying method.

4. Antibiotics. This method involves the use of fertilizers soaked in 1:3-6 solutions of "5413" and other antibiotics. This method reduces wheat bunt from 30.7 percent to 4.3 percent. The East China Institute of Agricultural Sciences recently produced a strain of Actinomycetes, "No S.68" with strong antibiotic properties. This antibiotic, applied for 4 days at temperatures above 20 degrees centigrade killed all molds and bacterias. "S.68" has no adverse effect upon grains; it is superior to the best known mercuric chloride treatment.

5. Agrochemical Treatments

a. Ceresan powder is used to combat *Brachysporium* diseases. In 1955, the Chekiang Provincial Institute of Agricultural Sciences combated the diseases caused by *Brachysporium* by the use of Ceresan concentrations ranging from 0.05 percent for 72 minutes to 0.2 percent for 6 minutes. The Kwangsi Agricultural Experiment Station has found that a 3 minute soaking in a 0.1 percent concentration of "Ku-jen-le-sheng" [6253/0088/2867/3932; probably a transliteration of an English-language trade name], $(C_2H_5Hg)_3PO_4$, was effective in combating seedling blight.

b. Acid mercuric chloride is used to combat "pai-yah k'u-ping" (4104/5509/ 2661/4016; literally, white leaf blight and seedling blight). According to studies made by the Nanking Agricultural College and the Kiangsi Provincial Institute of Agricultural Sciences, this disease can be effectively destroyed by the use of a mixture containing a 0.03 percent concentration of mercuric chloride and a 0.15 percent concentration of hydrochloric acid.

c. Benzene hexachloride and nitrobenzene pentachloride are used to combat wheat bunt transmitted through the soil. Good results in treating wheat bunt by the application of benzene hexachloride were obtained in 1957 by the Institute of Plant Protection, Chinese Academy of Agricultural Sciences. Even better results were obtained by the East China Institute of Agricultural Sciences and the Suchow Tsa-ku Experiment Station by the use of nitrobenzene pentachloride.

d. Arsenic is used to combat wheat nematodes. The Kansu Agricultural Experiment Station has successfully used 0.02 percent concentrations of arsenic to combat nematodes; it also combats wheat bunt.

Other chemicals used to combat *Ustilago nuda* and *Ustilago tritici* include arsenious oxide, formaldehyde, sulfur, "tsao-fan" [4103/4345/ literally, soap alum], and "lu-fen ching-chi hung" [3048/6788-0433/8641/1015/3074; hydrogen mercury chlorophenol].

Despite its advantages, the use of chemicals still presents some problems; of these, the dangers to men and animals and the need to increase available agrochemicals are the most serious.

III.

The results of using the water-soak treatment in the disinfection of wheat containing *Helminthosporium* and *Fusarium* were extremely good. *Alternaria*, however, proved very resistant to heat treatment; exposure to temperatures of 37 degrees centigrade for one day and 15 degrees centigrade for six days showed no appreciable effect. The results of treating rice for *Piricularia* at 20 degrees centigrade for seven days in the pure water water-soak treatment were not altogether satisfactory; best results were obtained by using a more rigorous treatment, that is, either raising the temperature or extending the time period, or by using lime water instead of pure water.

IV.

Other units involved in research on seed disinfection included: The Northeast Institute of Agricultural Sciences, which studied the effects of the commonly used water-soak method; the Fukien Province Chin-chiang Hsien Agro-technical Station, which studied wheat bunt; the Kiangsu Wang-t'ing Agricultural Experiment Station, which conducted experiments on using the lime water water-soak method in 1958; the Kiangsu Ch'ang-chou Special District Institute of Agricultural Sciences, which studied, in 1958, the effects of the lime water water-soak treatment on "white leaf blight;" and the Kiangsu Branch, Chinese Academy of Agricultural Sciences, which has carried out recent studies on the use of No S.68 on rice seeds.

V.

The two most important remaining problems in the treatment of seeds are the harmful effects on seeds arising from treatment and the development of spoilage retardation agents; these problems require continued study.

HOPEH PROVINCE COMPLETES SOIL SURVEY - Peiping, Kuang-ming Jih-pao,
29 Oct 62, p 4

After several years of work, Hopeh Province agricultural science research units, with the support of various levels of party and government leading organs, have completed a soil survey of the whole province. By surveying 118 million mou of cultivated land and part of the barren land in the province, they determined details concerning cultivated lands in the plain, seacoast, mountain and embankment soil regions, and found that cultivated land in the province was composed of 13 soil areas, 74 soil groups, and 218 types of soil. Chemical analysis according to area and type of soil yielded information on the quality, fertility, organic material, lime content, and pH value of the various types of soil.

Among the units participating in this project were the Hopeh branch of the China Academy of Agricultural Sciences, pedology workers of the Hopeh Province Bureau of Resources Utilization, and agricultural technicians of the province, special districts, hsien, and communes, as well as concerned instructors and students of Hopeh University, Hopeh Agricultural College, and Shih-chia-chuang Normal College.

KIANGSU AGRICULTURAL SCIENCE DEPARTMENTS STUDY PHOSPHATE FERTILIZER --
Peiping, Jen-min Jih-pao, 31 Oct 62, p 2

The Kiangsu branch of the Chinese Academy of Sciences and its subordinate institutes in various special districts have carried out a great many experiments in the application of phosphate fertilizers in various areas. Up to present, they have made a further determination of the types of soils and crops in this area which are suitable for the use of phosphate fertilizers and methods of improving the effectiveness of the fertilizers. Their experiments show that phosphate fertilizers would be very effective in the terra brava of the hilly district around Chin-chiang, yellow sandy soil, and red sandy soil, as well as desalinated and lightly salinated soil in the sea coast areas. It can also be used in the yellow uneroded soil of the Hsu-chou area, and on the blue-black mud soil of the Soochow area.

ANNUAL ANIMAL HUSBANDRY AND VETERINARY CONFERENCE HELD IN HU-HO-HAO-T'E --
Peiping, Kuang-ming Jih-pao, 30 Oct 62, p 2

Some 70 specialists attended the annual conference of the Chinese Society of Animal Husbandry and Veterinary Science held from 17 to 27 October 1962 in Hu-ho-hao-t'e, Inner Mongolia. Three hundred and seventy reports were submitted at the conference. In the past few years, scientific workers investigated fodder producing areas in the Northeast, Northwest, and Southwest and compiled some valuable references on fodder. For example, "The Question of Correct Planning and Rotation of Fodder Crops and Other Crops in Kuanchung [Shensi]" summarizes the experiences of the peasants in crop rotation from the point of view of agriculture and animal husbandry. It points out that the rotation of many crops such as peas and alfalfa not only supplies fodder but also enriches the soil and ensures an increased grain output.

Many attending the conference believed that to increase the productivity of grassland is to ensure basically the development of animal husbandry. Attention must be paid to reclaiming dry areas so that these areas can be grazed, thus allowing the ones currently used to lie fallow for a period. Deteriorated grassland should be resown in legumes to improve the quantity and quality of the grass.

From the viewpoint of feed and care of domestic animals, there was discussion on domestic animal feeding standards under prevailing production conditions. Regarding feeding standards for hogs, many advocated that coarse fiber can be placed in the category of green coarse fodder, the latter being essential to hog raising in China. They also advocated that proteins, vitamins, and minerals cannot be overlooked in meeting the standards.

Animal husbandry specialists summarized breeding experience in Inner Mongolia and discussed developing trends in local breeding. Many present believed that types and breeds should be raised in accordance with overall conditions in China; for example, the San-ho horse was developed to be both a riding and draft animal and the San-ho cow was developed for both milk and meat. The Inner Mongolian Ao-han sheep is a new type of fine-haired sheep that is used for both meat and wool. Some localities, however, have never insisted upon fine-haired sheep, but it is appropriate that they should look into raising semifine-haired sheep. And everyone should examine the prospects of raising small and medium size, early-maturing types of hogs.

Many present maintained that inbreeding not only must hereditary improvement be carried out but also that improvement of superior local breeds through perpetuation and selection must be watched. As for draft animals, attention should be paid to increasing their size and strength.

Veterinarians held that protecting the young of sheep, hogs, and other animals from intestinal diseases is a most important aspect of disease prevention. Different views on the cause of these diseases in hogs were presented. Some believed they are inherited, being transmitted by a specific pathogenic microbe. Others believed they are caused by environmental factors, feed, *Escherichia coli*, or other pathogenic bacteria, sometimes contagious and sometimes not. On the other hand, some are not contagious in the early stages of sickness but gradually become so. Everyone recognized that in the field of disease prevention, measures for improved feeding are important; for example, prior to bearing, a sow should be fed silage. Further, spring and fall can be chosen as bearing periods, and animal buildings should be kept dry and clean. Veterinarians also discussed control of Brucellosis, schistosomiasis, and other diseases.

The spirit of the 10th Plenum of the Eighth Central Committee was transmitted and enthusiastically received at the conference. In addition to discussing technological problems, many interesting views on how to develop production in animal husbandry operations were presented.

MUKDEN AGRICULTURAL COLLEGE GRADUATES NUMBER 3,000 -- Peiping, Kuang-ming Jih-pao, 20 Oct 62, p 1

In the 10 years since its founding, Mukden Agricultural College has turned out some 3,000 agricultural technicians. They are now working in basic-level agricultural units, agricultural schools, and agricultural scientific research departments in the Northeast, Inner Mongolia, Sinkiang, and Tibet. Some 600 graduates are in basic-level agricultural technology work in agriculture technological advancement stations, animal husbandry and veterinary stations, tractor stations, and state operated farms.

At present, the college is training more than 3,300 young men and women of Han, Manchu, Mongolian, Moslem, and Korean nationality. The college has over a hundred experimental laboratories and reference material consisting of some 300,-00 documents, maps, books, and magazines. In addition to operating its own farms and factories for teaching purposes and scientific research and production labor areas, it maintains cooperative relations with people's communes and has paved the way for investigating agricultural technology and participating in its reform.

PEIPIING COLLEGE OF AGRICULTURAL MECHANIZATION HAS GRADUATED 2,000
TECHNICIAN CADRES -- Peiping, Kuang-ming Jih-pao, 20 Oct 62, p 1

On 15 October 1962, Peiping College of Agricultural Mechanization celebrated its tenth anniversary. During this period, the college has turned out more than 2,000 graduates, now scattered throughout various agricultural machinery and tractor stations, state-operated farms, agricultural machinery plants, repair plants, agricultural mechanization schools, and scientific research organs. All these specialists are now making great contributions to national agricultural mechanization and production. The Farm Water Conservancy and Agricultural Electrification Department, the last of the college's four departments to be established, is about to turn out its first group of graduates.

EAST CHINA HYDRAULIC ENGINEERING COLLEGE PROJECTS ASSIST AGRICULTURE --
Peiping, Kuang-ming Jih-pao, 24 Oct 62, p 2

The Hydrology Department of the East China Hydraulic Engineering College is actively engaged in research projects closely related to agricultural development. Some of the six projects completed this year have already been sent to production units. Four of the six are prime targets of the school's research program, and one, "Regional Hydrologic Forcasting," is a prime target of the commission of the Water Conservancy Department of Chekiang Province. The data obtained through this project from experiments in hydrologic forecasting in certain areas in the province was submitted as reference material for flood prevention and waterlogging prevention in other more expansive areas in the province.

Hydrologic forecasting work in the past tended to be centered on large and medium rivers or an individual station. This is the first time it is being done on a regional basis. After the school accepted the responsibility for these projects, it integrated them into the graduating class's projects and sent personnel to provincial production units to do research, which has been going on for the past two years.

The students working on these research projects employ operations research and mathematical statistics in their work. Other projects are entitled: "Reservoir Forcasting Calculations and Standary Calculations," "Computations for Plotting Storms," "Balance Between Reservoir Water and Sand," and "The Hydrogeologic Problem of Saline Soil in Irrigated Land."

BIOLOGICAL AND MEDICAL SCIENCES

NURSING SOCIETY OF CHINA HOLDS FIRST ANNUAL CONFERENCE -- Peiping, Kuang-ming Jih-pao, 3 Nov 62, p 1

More than 50 nursing delegates from all parts of China held a conference in Peiping from 17 to 23 October. They discussed problems of improving the qualities of nursing, and exchanged experiences in research on basic nursing and special nursing. This was the first national conference since the Nursing Society of China was established 50 years ago.

Premier Chou En-lai (0719/1869/0171) and Deputy Premier Lo Jun-ch'ing (5012/3834/0615) received the delegates at the conference. Addresses were delivered to the conference by Teng Ying-ch'ao (6772/4481/6389), Vice chairman of the Women's Federation of China, Li Te-ch'uan (2621/1795/0356), Minister of Public Health, and Fu Lien-chang (0265/6647/8517), President of the Chinese Medical Association. All of these speakers had great praise for China's more than 200,000 nurses and their work.

At the conference, the delegates agreed that basic nursing is a complicated and detailed science, with a direct bearing on the effectiveness of therapy and the development of medical research. They suggested that the administrative areas should give more serious consideration to nursing, improve the regulatory system in the field, and institute uniform procedures. At the same time, it was requested that every worker in nursing be required to take a periodic examination.

The conference received a total of more than 300 papers, all of them of relatively good quality. From the papers it was apparent that nursing in China has developed greatly since the liberation.

GEOGRAPHICAL INVESTIGATION OF K'AO-SHAN DISEASE -- Peiping, Kuang-ming Jih-pao, 20 Oct 62, p 2

A great deal of interest was exhibited in the report of one of the special guests at the recent National Symposium on K'ao-shan Disease at Hu-ho-hao-t'e. This guest was Asst Prof Chang Pao-sheng (1728/0202/0581) of the Geography Department, Northwest University. In March 1962, he had accepted the invitation of Prof Haileh Ching-k'uei (6200/2529/1145),

vice-president of Sian Medical College, to carry out an investigation of the natural geography of the endemic area of K'o-shan disease. During a period of one month, these two men travelled more than 300 miles, starting in Sian, going east through Lin-t'ung and Wei-nan, then north across the Wei Shui and through P'u-ch'eng and Pai-shui, across the Lo Ho, and finally arriving in the Huang-lung Shan area. They carried out investigations at Huang-lung, in the Huang-lung Shan area, and in some of the areas adjoining it, such as I-ch'uan and Lo-ch'uan, as well as Tzu-wu-ling and several other hsien on the Shensi-Kansu border, all within the area where the K'o-shan disease occurs. They then returned to Sian and continued their investigations to the southeast, near Lan-t'ien and Shang Hsien.

The area of incidence of the K'o-shan disease forms a belt from the Ta'hsing-an-ling [mountain range] in the Northeast, through eastern Inner Mongolia, to southeastern Shensi Province. According to this current investigation of Shensi Province, the areas of most serious incidence of the disease are on mountain ridges. In general, the upper reaches streams, near the watershed divide, and the lower reaches of streams are areas of low or no incidence.

Relatively large plateaus are usually areas of low or no incidence, and if cases of the disease occur, they are usually located on the edges of the plateau. The soil in areas of heavy incidence is usually residual soil, and the soil strata is relatively thin. Moreover, in the lower reaches of streams, there are thick strata of alluvial loess. There are regions of heavy accumulations of loess in all of the areas of heavy incidence, and the incidence in these regions is frequently lighter than in the surrounding area. From these circumstances, it can be seen that the areas of heavy incidence, geologically and geomorphologically, are the so-called "erosion areas", and are usually the areas of the greatest local altitude, and having relatively heavy rainfall. It was surmised that the disease might be caused by shortage of various elements in the soil and water of a region and the corresponding excess of other elements. Whether this theory is valid in other areas where the K'o-shan disease occurs must be decided by further investigations.

CHINESE MEDICAL DELEGATION ARRIVES IN KARACHI -- Peiping, Kuang-ming Jih-pao, 2 Nov 62, p 3

On 1 November, two delegates of the Chinese Medical Society, Pai Shih=ming (2071/1102/6900) and P'an Shao-ch'uan (3382/1421/1557) arrived in Karachi. These delegates have come at the invitation of the Medical Association of Pakistan to attend Pakistan's seventh annual medical conference in Hyderabad. Representatives of the Pakistan Medical Association and the Chinese Charge d'affaires in Pakistan, Hsu Ying (1776/5391) came to the airport to welcome them.

LHASA HOSPITAL SURVEYS ACCOMPLISHMENTS -- Peiping, Kuang-ming Jih-pao,
18 Oct 62, p 1

The Lhasa Tibetan Medicine Hospital (La-sa Ts'ang-I-Yuan; 2139/5646/5661/68297108) has accomplished a great deal in the three years since it has been established, both in the treatment of diseases and in research on Tibetan medicine. Ch'iang-pa-ch'ih-lieh (1730/1572/6375/3525), deputy director of the hospital, attributes these accomplishments to the director of the hospital, Ch'in-jao-lo-pu (2953/7437/5012/1580).

Ch'in-jao-lo-pu has been practicing traditional Tibetan medicine for almost 60 of his 81 years. He is the author of works, read throughout Tibet, on the diagnosis and treatment of infantile diseases. In addition to handling several important cases and instructing young practitioners in the theory of Tibetan medicine, he also is the author of Ts'ang-i Chien-shih / Short History of Tibetan Medicine/ and co-author of I-pai-ling-sun Chung Ch'ang-oh'ien Ping-chuang ho Ch'u-fang /103 Common Symptoms and Their Treatment/ and Erh-pai Chung Ts'ao-yao Hsing-neng ho Ying-yung / The Properties and Uses of 200 Herbs/.

The practitioners at the hospital have organized a research team to discuss problems encountered during treatments in the hospital and in the field. Practitioners of Tibetan medicine often exchange experiences with medical personnel of the Lhasa Municipal People's Hospital.

In recent years, the practitioners of Tibetan medicine have had abundant experience in treating rheumatic arthritis, gastric ulcers, and over ten other kinds of diseases common in high plateau regions. Many seriously afflicted persons have come from Shan-nan, Lin-chih, and northern Tibet to Lhasa for examination.

INFRARED RAYS PROMOTE DEVELOPMENT OF CHICK EMBRYOS -- Peiping, Kuang-ming Jih-pao, 29 Oct 62, p 4

In the past, it was generally supposed that infrared rays could retard embryo development, or even kill embryos. On the contrary, Sung Shang-chih (1345/1424/4160) of Hopeh University reported to the 1962 annual conference of the Chinese Society of Animal Husbandry that a suitable period of exposure to infrared rays can promote the development of chick embryos.

In the course of his experiment, he discovered that exposure to infrared rays accelerated the transition from the embryo stage, improved the development of the nervous system, the circulatory system, the digestive organs, and the organs of reproduction and elimination, and in some cases, caused the organs of the head, feathers, lower limbs, and claws to develop ahead of schedule. Not only was the incubation period reduced and the hatching rate increased, but the chicks were well developed and healthy as well.

RAPID DEVELOPMENT OF YOUNG TEACHERS AT SHANGHAI AQUATIC PRODUCTS COLLEGE --
Peiping, Kuang-ming Jih-pao, 5 Oct 62, p 2

The young teachers turned out by Shanghai Aquatic Products College in the course of the Great Leap Forward have already become an important factor in teaching and scientific research work. Before 1958, this college had only four specialized courses, mostly taught by old teachers, but now it has eight and the majority of the teaching is done by young teachers. This semester the school has several dozen basic and specialized classes, and about 60 percent are taught by young teachers. The major portion of the four new courses introduced during the Great Leap Forward, marine reproduction, refrigeration, fishing industry machinery, and canning technology, are being taught by young teachers. Beginning this year, graduating students are doing their designs and theses under the guidance of young teachers. In addition, young teachers have been sent to fraternal colleges in Kiangsu, Anhwei, and Chekiang to teach.

In the past few years, both old and young teachers gave 14 new and make-up courses in such subjects as increased production in natural water regions, algae culture, mollusk culture, aquatic resources, and technology of fishing equipment and material. Prior to 1958, 12 of these courses had been incorporated in the teaching program many times but could not be given because of a teacher shortage. These courses have enriched the student's specialized technical knowledge and basic knowledge.

Since 1958, 35 of the young teachers have entered the party. Since then the school has thoroughly implemented the party's education policy. The young teachers of the various teaching and research sections have guided the students in participating in specialized labor and in production practice and graduate practice. They have gone to fishing villages, boarded fishing boats, gone to hatcheries, and to aquatic product processing plants to investigate and do research on production and technology, thus gaining a knowledge of production and accumulating a wealth of material on technology.

In the three years of the Great Leap Forward, the young instructors collected and catalogued native and foreign reference material on production in the fishing industry, collected over 2,00 specimens, and compiled over 1,000 maps and charts. They made a report with maps and charts on the entire country's seas, fishing boats, and fishing equipment and drew maps of the types of economic fish and their distribution in the East China Sea. They made investigations of culture techniques in ponds with high yields. They made hydrobiological investigations of the coasts and shores of Fukien, Chekiang, and Shanghai and investigations of the comprehensive utilization of aquatic plants and animals in the waters around Chou-shan, Chekiang. All these projects are valuable and some are being supplied to production.

C-O-N-F-I-D-E-N-T-I-A-L

HUNAN INSTITUTE CROSSBREEDS FISH -- Peiping, Kuang-ming Jih-pao, 29 Oct 62,
p 4

During 1962, the Hunan Province Institute of Aquatic Products has carried out three experiments in the crossbreeding of tench and *Ctenopharyngodon idellus*. The experiments have obtained a total of more than 13,000 fry. After two months of care, the fry had reached a length of about 16 centimeters.

The two parent fish are very common domesticated fish in China. The tench were employed as the maternal parents in the crossbreeding. In some respects, the fry resemble their paternal parents, and in some respects, the maternal parents. They feed on other aquatic animals or plants, and they grow faster than either of the parent fish.

TECHNICAL SCIENCES

IMPROVED METHOD FOR DESIGNING BLOCKING OSCILLATORS -- Peiping, Wu-li Hsueh-pao Vol 18, No 2, Feb 62, pp 72-80

[The following is a translation of the Russian-language resume of the Chinese article, "On Designing Vacuum Tube Blocking Oscillators By Applying the Law of Circuit Distribution," by Chou Hsi-ling (0719/6932/7881). References cited include (1) Meyerovich, L. A., Zelichenko, L. G., Impul'snaya Tekhnika, "Soviet Radio" Publishing House 1954; and (2) Vaz', G. A., Raschet Impul'snykh Skhem, Military Publishing House, 1960. The article was received for publication on 22 July 1961.]

The classical method for designing vacuum tube blocking oscillators based on the application of static characteristics to a differentiating circuit [Sources 1,2], is not suitable for generating a waveform. In particular, this method cannot obtain the optimum value for the number of turns. This article introduces analytical expressions for triode tubes in a regime of large grid current. A simple and more accurate method for designing blocking oscillators is proposed, using these expressions.

[The following supplementary information appears in the Chinese text of the article:]

$$\text{The equations } P = f_1(q) \quad (1)$$

$$\text{and } I_k = S_m U \text{ effective} \quad (2)$$

simply and effectively describe the characteristics of a triode with a large grid current. In these equations, $P = \frac{I_k}{I_a}$ and $q = \sqrt{\frac{U_g}{U_a}}$

I is the current, U is the electrode voltage, g is the grid, a is the anode, and S_m is the transconductance and a constant.

The optimum turn ratio [sic, probably should be "number of turns"] to be used in the design of the tube is obtainable from the relationships

$$I = \frac{I_k}{1 + P} = \frac{S_m(U_g + \frac{1}{n}U_a)}{1 + P} = \frac{S_m}{1 + P} \frac{q^2 + \frac{1}{n}}{1 + mq^2} (E_a - nE_g) \quad (3)$$

In the above expression, n is the [number of turns in the ratio:1: n], k is the cathode, q is the grid control ratio, and E is the emf applied to the transformer.

If the I_A at the point, A , where the top of the curve begins to flatten is made the "heng-liang piao-chun" [literally, "balancing standard"], an estimate of the optimum [number of turns] can be made using the expression

$$\frac{I_A A}{S_m E_a} = \frac{(1-M)}{K} \frac{q_A A^2 - \frac{1}{u}}{1 + mq_A A^2} - \frac{1}{1+M} \quad (4),$$

where $K = \frac{E_a}{E_g}$, and q_A is determined by equation (1). (CONFIDENTIAL)

BEAMS IN ELASTIC FOUNDATIONS ANALYZED -- Shanghai, T'an-hsing

Ti-chi Liang Chieh-fa (A Method for Analyzing Beams in Elastic Foundations), Apr 62, pp 1-2

[The following are extracts from a book entitled as above, published by the Shanghai Science and Technology Press, 167 pages long, written by Ts'ai Szu-wei (5591/0934/4850).]

This book introduces a new method for analyzing beams in elastic foundations by the use of the differential equation of the beams skew line, $\frac{d^2y}{dx^2} = - \frac{M}{EI}$, as well as a description of the theoretical

basis of this analysis and its practical applications. The new method was presented first in T'u-mu Kung-ch'eng Hsueh-pao (Civil Engineering Journal), No 5 and 10, May and October 1959. The presentation in the present book includes a more complete discussion of the underlying theories than did the original articles.

A brief introduction to the approximation method for the analysis of beams in elastic foundation, as used by [B. N.] Zhemochkin in his theory of semi-infinitely elastic bodies, is given. The author's analytical method is based both on Zhemochkin's work and on the Wen-k'o-erh (2429/3344/1422) [an unidentified transliteration] method which is in common use at the present time. Several methods of analysis, using a set of linear algebraic equations, are introduced, as these are required in the last stage of the author's method. The final set of linear algebraic equations can best be solved using the successive addition method.

The book should be a useful reference work for those engaged in hydraulic and soil engineering as well as for instructors in related fields. A knowledge of material mechanics and elementary mathematical analysis is sufficient background for an understanding of the book.

HSIN-HUA SPARE-TIME UNIVERSITY ACTIVE -- Peiping, Kuang-ming Jih-pao, 21 Oct 62, p 2

Hsin-hua Spare Time University has made great strides since 1958. The first graduating class, consisting of 145 persons, graduated last semester after three or four years of spare time study.

Courses in machinery manufacturing, elementary organic synthesis, radio technology, electric motor manufacturing, telecommunications, and therapeutics are now among the courses offered in the general curriculum.

At present, over 2,700 students are enrolled in the university, most of whom are young cadres with middle school educations.

The Hsin-hua Spare-time University at present has 25 [full-time] instructors, most of whom have college educations. The 55 part-time instructors include professors, lecturers, general engineers, [other] engineers, doctors from departments of hospitals, and general practitioners. The part-time instructors handle almost half of the courses taught.

Dr Ts'ao Ching-yun (2580/2529/0061), assistant director, Surgery Department, Hsin-hua Hospital, is a part-time instructor at the university, teaching the courses in human anatomy and surgery. Radio specialist Ho Ming-ch'ien (0149/7686/6197) gives the courses "Transceiving" and "Pulse Technique." Ho is a technical cadre in the Tientsin Municipal Bureau of Electrical Industry.

The university receives the full support of nearby units. For example, Hopeh University, Tientsin Medical College, and the Hsin-hua Hospital helped the university solve its experimental equipment problem.

SHANTUNG ENGINEERING COLLEGE LIBRARY FACILITIES IMPROVED -- Peiping, Kuang-ming Jih-pao, 10 Oct 62, p 2

During the last semester, the library of Shantung Engineering College supplemented their supply of back issues of foreign-language periodicals; these now consist of 59 titles and a total of 867 issues. The library also works closely with other libraries. Last semester, personnel from the Shantung Machinery College (Shantung Chi-hsieh Hsueh-yuan; 1472/2639/2894/2750/1331/7108), the Shantung Provincial

Department of Industry, the Tsinam Automobile Factory (Chi-nan Ch'i-ch'e Ch'ang; 3444/0589/3086/6508/1681), and 12 other units visited this library. In addition, this library sent letters or personnel to the [Chantung] Provincial Library, the library of the Shanghai Branch, Chinese Academy of Sciences, and over 10 other units to view their collections of Chinese and foreign-language books and periodicals.

HARD PLASTICS USED FOR AGRICULTURAL TOOLS -- Peiping, Jen-min Jih-pao, 30 Oct 62, p 2

Recently, the Nanking Plastics Plant (Nan-ching Su-liao Ch'ang) 0589/0079/1043/2436/1681 has been carrying out experimental production of various farm tools using hard plastics (such as hard polyvinyl chloride), according to Sun Tsai-chian (1327/6528/1017), of the Nan-king College of Chemical Engineering (Nan-ching Hua-kung Hsueh-yuan; 0589/0081/0553/1562/1331/7108). The products include such farm tools as Chain pump blades, scrapers, and shovel blades. Trial production of small quantities of these tools has already begun. The hard plastics used have many good points; they are tough, resistant to water absorption, they do not corrode, and they resist friction and oxidation. The hard plastics have a few shortcomings, namely, lack of hardness and strength, and the fact that they are deformed by boiling water, thus restricting their usage.

BIOGRAPHIC INFORMATION

[The following biographic information on selected Chinese Communist scientific and technical personnel was taken from sources cited in parentheses.]

CHANG Fu (1728/3940): author of an article, "Infrared Rays."
(Peiping, Kuang-ming Jih-pao, 19 Oct 62, p 2)

CHANG Yu-shang (1728/0645/1424)

TS'AO T'ien-ch'in (2580/1131/2953)

Both affiliated with Institute of Biochemistry, Chinese Academy of Sciences, Shanghai; coauthors of article, "Conformational Changes of Rabbit Tropomyosin in Different Solvents," in English; first published in Chinese in Acta Biochemica et Biophysica Sinica, Volume 2, No 2, 1962, pages 120-130. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1353-1368)

CHUNG Wen-ting (6945/2429/1353), Physics Dept, Peiping University

WANG Cheng (2799/2973), Physics Dept, Lanchow University

Coauthors of article, "Research of Magnetic Properties of MnBi Alloy Under Different Conditions After Heat Treatment," in Russian; first published in Acta Physica Sinica, Volume 18, No 4, pages 188-193. (Peiping, Scientia Sinica, Vol 11, No 10, pp 1323-1332)

HO I-hsun (0149/3015/0534)

HSIAO Shu-hua (5618/2885/5478)

MAO Shou-pai (3029/1343/4101)

SHAO Pao-jo (6730/5508/5387)

YANG Yuan-ch'ing (2799/0337/3237)

All of the Institute of Parasitic Diseases, Chinese Academy of Medical Sciences; coauthors of an English language article, "Studies on the Propylactico-therapeutic Effect of Cucurbitine in Experimental Schistosomiasis Japonica in Mice," first published in Chinese in Acta Pharmaceutica Sinica, Volume IX, No 6, 1962, pages 327-332. (Peiping, Scientia Sinica, Vol 11, No 11, Nov 62, pp 1527-1534)

HO Tuan-seng (0149/4551/0300)

YU Ch'eng-fang (0151/6134/2455)

WANG Hsu (3769/1645)

All affiliated with Department of Pharmacy, Peiping Medical College; coauthors of article, "Chemical Studies on the Chinese Drug, I-Mu-Tsao: I. The Structure of Alkaloid A," in English. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1341-1352)

HU Kuang-hsing (5170/1648/5281), Institute of Geophysics and Meteorology, Chinese Academy of Sciences; author of English language article, "A Nonlinear Theory of the Decay of Therma Convection," first published in Chinese in Acta Meteorologica Sinica, Volume 32, No 2, 1962 pages 154-163. (Peiping, Scientia Sinica, Vol 11, No 11, Nov 62, pp 1559-1568)

HUANG Chi-ch'ing (7806/3078/3237)

CHIANG Ch'un-fa (1203/2504/4099)

Both affiliated with Academy of Geological Sciences, Ministry of Geology; coauthors of article, "A Preliminary Investigation of the Evolution of the Earth's Crust From the Point of View of Polycyclic Tectonic Movements," in English; first published in Chinese in Acta Geologica Sinica, Volume 42, No 2, 1962, pages 105-152. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1377-1442)

HUANG Jung-tsun, Moscow Institute of Petrochemical and Gas Industry imeni Academician I. M. Gubkin and Institute of Geology and Processing of Mineral Fuels, Academy of Sciences USSR; author of article, "The Effect of Temperature on the Deformation of Sedimentary Rocks," in Russian. (Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy, Neft' i Gaz, No 10, Oct 62, pp 15-19)

HUANG Wen-hsi (7806/2429/3556), Institute of Hydrotechnical Research, Tsinghua University; author of English language article, "Structural Analysis of Arch Dams, Shells, and Plates;" first published in Chinese in The Journal of Hydraulic Engineering No 5, 1962 pages 19-43. (Peiping, Scientia Sinica, Vol 11, No 11 Nov 62, pp 1569-1606)

JEN Lang (0117/2597), Tangshan Railway College; author of article, "Radiation from a Linear Monopole at the Tip of a Metallic Prolate Spheroid," in English. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1333-1340)

KAO Wen-hsiu

WANG Hsiao-nan

Coauthors of article, "Calculation of Wind Waves on a Sea of Arbitrary Depth," in Russian. (Moscow, Meteorologiya i Gidrologiya, No 10, Oct 62, p 60)

KO T'ing-sui (5514/1656/3606)

WANG Ch'ung-kuang (3769/0022/0342)

Both of the Chinese Academy of Sciences; coauthors of English language article, "The Pinning and Unpinning of Dislocations in Al-4 percent Cu Alloy under Fatigue Loading," first published in Chinese in Acta Physica Sinica, Volume 18, No 8, 1962 pages 392-399. (Peiping, Scientia Sinica, Vol 11, Nov 62, pp 1481-1490)

LAI Wan-ts'ai (6351/5502/2088), Overseas Chinese University, Chuan-chou, Fukien; author of article, "On a Conjecture of Goodman for Almost Bounded Functions," in English; first published in Chinese with a German summary in 1959 in Acta Mathematica Sinica, Volume 9, 1959, pp 292-294. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1303-1305)

LI T'ing-ming, Institute of Cardiovascular Surgery, Academy of Medical Sciences, USSR; author of article, "Cavapulmonary Anastomosis in Tetralogy of Fallot," in Russian. (Moscow, Grudnaya Khirurgiya, No 5, Sep/Oct 62, pp 53-57)

LIU Ts'un-wan, Chair of Physical Chemistry, Moscow University; coauthor with V. M. Tatevskiy of article, "New Developments in Lower Excitation Levels of Electron Migration in Spectra of Polynuclear Aromatic Hydrocarbons," in Russian. (Moscow, Vestnik Moskovskogo Universiteta, No 5, Sep/Oct 62, pp 90-91)

LIU Ying-chun, Chair of Geochemistry, Moscow State University; author of article, "Primary Dispersion Aureol Around the Main Ore Body of Tirny-Aus Deposit," in Russian. (Moscow, Vestnik Moskovskogo Universiteta, Seriya 4, Geologiya, No 5, Sep/Oct 62, pp 36-43)

LO Hsian-mao, A. A. Bogomolets Institute of Physiology, Academy of Sciences, Ukrainian SSR and Kiev Post Graduate Institute of Physicians; author of article, "Effect of Neurotization on the Appearance and Development of Induced Mammary Tumors in Rats," in Russian. (Kiev, Akademiya Nauk Ukrayns'koy RSR, Fiziolichniy Zhurnal, Vol 8, No 5, Oct 62, pp 669-670)

MU Ping-wen, Moscow University coauthor with T. A. Belyavskaya and I. P. Alimarin of article, "Chromatographic Methods for Separating Zirconium and Beryllium," in Russian. (Moscow, Vestnik Moskovskogo Universiteta, Seriya 2, Khimiya, No 5, Sep/Oct 62, pp 41-44)

PAO Wen-k'uei (7637/2429/1145); author of "Application of Genetics in Seed Propagation." (Peiping, Kuang-ming Jih-pao, 24 Oct 62, p 2)

SHEN Chi-ch'un (3088/7873/2504)

LI Shih-wan (2621/1102/1238)

Coauthors of article, "Further Studies on the Benzol-Adrenaline Cardio-Ventricular Fibraillation," in English. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1369-1376)

SHIH Tien-ch'eng, Institute of Epidemiology and Microbiology imeni N. F. Gamaley, Academy of Medical Sciences USSR; coauthor with R. Yu. Tashpulatov of article, "Analysis of the Antigens of the Ecologically Connected Pathogenic and Nonclassified E. Coli Strains by Precipitation in Gel," in Russian. (Moscow, Zhurnal Mikrobiologii, Epidemiologii, i Immunobiologii, No 11 Nov 62, pp 148-153)

SU Pu-ch'ing (5685/2975/7230), of Fu-tan University; author of an English language article, "Contributions to the Theory of Conjugate Nets in Projective Hyperspace (V)." (Peiping, Scientia Sinica, Vol 11, No 11, Nov 62, pp 1443-1454)

T'ANG Ao-ch'ing (0781/2407/1987)

CH'EN Shih-yuan (7115/0013/0337)

Both of Institute of Applied Chemistry, Chinese Academy of Sciences, Ch'ang-ch'un; coauthors of English language article, "Potential Functions of Restricted Internal Rotation in Molecules;" first published in Chinese in Acta Physica Sinica, Volume 18, No 3, 1962 pages 143-158. (Peiping, Scientia Sinica, Vol 11, No 11, Nov 62, pp 1491-1512)

TSOU Ch'eng-lu (6760/2110/7627), Institute of Biochemistry, Chinese Academy of Sciences, Shanghai; author of English-language article "Relation Between Modification of Functional Groups of Proteins and their Biological Activity, A Graphic Method for the Determination of the Number and Type of Essential Groups;" first published in Chinese in Acta Biochimica et Biophysica Sinica, Volume 2, No 3, 1962 pages 203-217. (Peiping, Scientia Sinica, Vol 11, No 11, Nov 62, pp 1535-1558)

WANG Shih-hua, Chair of Inorganic Chemistry, Moscow University; co-author with L. M. Kovba of article, "Reduction of Uranyl Vanadates by Hydrogen," Also coauthor with L. M. Kovba and Viktor I. Spitsyn Article "Investigation of Mixed Uranates of Sodium and Calcium" in Russian. (Moscow, Vestnik Moskovskogo Universiteta, No 5, Sep/Oct 62, pp 60-65)

WU Wen-chun (0072/2429/0193)

CHIANG Chia-ho (3068/0857/4421)

Both affiliated with Institute of Mathematics, Chinese Academy of Sciences, coauthors of article, "Essential Equilibrium Points in Person n-Person Non-Cooperative Games," in English. (Peiping, Scientia Sinica, Vol 11, No 10, Oct 62, pp 1307-1322)

YANG Shih, Physicotechnical Laboratory, Academy of Sciences, Armenian SSR; coauthor with A. P. Pikalov of article, "Autodyne for YaMR Spectrometer With a Quartz Stabilizing Frequency," in Russian. (Yerevan, Doklady Akademii Nauk Armyanskoy SSR, Vol 35, No 4, Oct 62, pp 167-171)

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UNCLASSIFIED
Central Intelligence Agency



Washington, D.C. 20505

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

A handwritten signature in black ink, appearing to read "Sergio N. Alcivar".

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

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Processing of OGA-Held CIA Documents



The following CIA documents located at DTIC were reviewed
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	File#	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0335308	78-03117A	194	1	23	4363	Scientific Information Report Chemistry And Metallurgy (26)	3/7/1963	71	Approved For Release	3/25/2004
AD0335625	78-03117A	197	1	3	4460	Scientific Information Report Chemistry And Metallurgy (27)	4/4/1963	51	Approved For Release	3/25/2004
AD0336825	78-03117A	199	1	26	4562	Scientific Information Report Chemistry And Metallurgy (28)	5/9/1963	70	Approved For Release	3/25/2004
AD0332150	78-03117A	183	1	5	3916	Scientific Information Report Chinese Science (11)	10/4/1962	52	Approved For Release	3/29/2004
AD0332434	78-03117A	183	1	40	3951	Scientific Information Report Chinese Science (12)	10/19/1962	59	Approved For Release	3/29/2004
AD0332795	78-03117A	184	1	37	3988	Scientific Information Report Chinese Science (13)	11/5/1962	48	Approved For Release	3/29/2004
AD0333069	78-03117A	186	1	7	4028	Scientific Information Report Chinese Science (14)	11/16/1962	30	Approved For Release	3/29/2004
AD0333148	78-03117A	187	1	19	4078	Scientific Information Report Chinese Science (15)	11/29/1962	44	Approved For Release	3/29/2004
AD0333835	78-03117A	189	1	6	4144	Scientific Information Report Chinese Science (16)	12/21/1962	65	Approved For Release	3/29/2004
AD0334108	78-03117A	190	1	2	4179	Scientific Information Report Chinese Science (17)	1/10/1963	56	Approved For Release	3/29/2004
AD0334105	78-03117A	191	1	12	4230	Scientific Information Report Chinese Science (18)	1/18/1963	25	Approved For Release	3/29/2004
AD0334378	78-03117A	192	1	21	4277	Scientific Information Report Chinese Science (19)	2/1/1963	27	Approved For Release	3/29/2004
AD0334433	78-03117A	193	1	22	4322	Scientific Information Report Chinese Science (20)	2/15/1963	28	Approved For Release	3/29/2004
AD0335021	78-03117A	194	1	37	4377	Scientific Information Report Chinese Science (21)	3/8/1963	59	Approved For Release	3/29/2004
AD0335847	78-03117A	198	1	33	4526	Scientific Information Report Chinese Science (22)	4/18/1963	61	Approved For Release	3/29/2004
AD0336327	78-03117A	200	1	3	4578	Scientific Information Report Chinese Science (23)	5/2/1963	68	Approved For Release	3/29/2004
AD0337167	78-03117A	201	1	26	4643	Scientific Information Report Chinese Science (24)	5/23/1963	95	Approved For Release	3/29/2004
AD0337777	78-03117A	202	1	27	4687	Scientific Information Report Chinese Science (25)	6/6/1963	52	Approved For Release	3/29/2004
AD0338474	78-03117A	203	1	27	4727	Scientific Information Report Chinese Science (26)	6/20/1963	83	Approved For Release	3/29/2004
AD0338687	78-03117A	204	1	32	4772	Scientific Information Report Chinese Science (27)	7/5/1963	80	Approved For Release	3/29/2004
AD0339386	78-03117A	206	1	4	4820	Scientific Information Report Chinese Science (28)	7/17/1963	32	Approved For Release	3/29/2004
AD0339147	78-03117A	207	1	11	4862	Scientific Information Report Chinese Science (29)	7/30/1963	48	Approved For Release	3/29/2004
AD0340927	78-03117A	208	1	35	4924	Scientific Information Report Chinese Science (30)	8/21/1963	53	Approved For Release	3/29/2004
AD0341855	78-03117A	209	1	43	4974	Scientific Information Report Chinese Science (31)	9/5/1963	46	Approved For Release	3/29/2004
AD0342464	78-03117A	210	1	38	5013	Scientific Information Report Chinese Science (32)	9/16/1963	43	Approved For Release	3/29/2004
AD0342608	78-03117A	211	1	36	5054	Scientific Information Report Chinese Science (33)	9/27/1963	41	Approved For Release	3/29/2004